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DELIRIUM IN OLDER EMERGENCY DEPARTMENT PATIENTS IS ASSOCIATED WITH INCREASED IN-HOSPITAL MORTALITY

ABSTRACT

Introduction: In this study, it was aimed determine in-hospital mortality, in-hospital length of stay, and independent predictors that predisposes to the development of delirium for identifying geriatric emergency department patients with delirium as well as those admitted to the hospital.

Materials and Method: Patients who were admitted to emergency department were included to the study if they were 65 years and older and hospitalised. A shortened version of Confusion Assessment Method was used to determine the presence of delirium during the initial emergency department management. Primary medical diagnosis and clinical outcome of the patients were followed-up from hospital electronic records.

Results: Six hundred and ninety three patients were enrolled in the study. The prevalence of delirium was 7.1% (n=49) in admitted geriatric emergency department patients. In-hospital mortality was more frequently observed in patients with delirium than in those without delirium (28.6% and 9%, respectively, p<0.001, OR=4.041, 95% CI=2.056-7.945). The hospital length of stay of patients with delirium was prolonged compared to patients without delirium (9 days and. 6 days, respectively, p=0.046). Predisposing factors for developing delirium were determined as previous history of cerebrovascular accident (OR=1.746, 95% CI=0.692-4.405), and sepsis (OR=59.915; 95% CI=11.880-253.851), pneumonia (OR=6.828; 95% CI=2.081-22.405), electrolyte imbalance (OR=23.020; 95% CI=5.296-10.063) or having current cerebrovascular accidents (OR=12.166; 95% CI=5.354-27.647) as their primary medical diagnosis.

Conclusion: Delirium is associated with increased in-hospital mortality and prolonged hospital length of stay in elderly admitted emergency department patients.

Key Words: Delirium; Emergency Medical Services; Mortality; Aged.

ARAŞTIRMA

YAŞLI ACİL SERVİS HASTALARINDA DELİRYUM, HASTANE YATIŞI SIRASINDA MORTALİTE ARTIŞI İLE İLİŞKİLİDİR

ÖZ

Giriş: Bu çalışmada, acil servisten hastaneye yatırılan ve deliryum tespit edilen geriatrik hastalarda hastane içi mortalite, hastanede kalış süreleri ve deliryum gelişmesine yatkınlık yaratan bağımsız faktörlerin tespit edilmesi amaçlanmıştır.

Gereç ve Yöntem: Acil servise başvuran ve hastaneye yatırılan 65 yaş üstü hastalar çalışmaya kabul edildi. İlk başvuru sırasında hastalarda deliryum varlığını saptamak amacıyla Konfuzyon Değerlendirme Metodu kısaltılmış versiyonu kullanıldı. Hastaların klinik sonlanımları ve birincil tıbbi tanıları hastanenin elektronik kayıtlarından takip edildi.

Bulgular: Çalışmaya 693 hasta kabul edildi. Deliryum prevalansı %7.1 (n=49) olarak saptandı. Hastane içi mortalite deliryum tespit edilen hastalarda deliryum tespit edilmeyenlere göre daha yüksek saptandı (sırasıyla 28.6% ve 9%, p<0.001, OR= 4.041, 95% GA= 2.056-7.945). Deliryum tespit edilen hastalarda ortalama hastanede kalış süresinin deliryum tespit edilmeyenlerden daha uzun olduğu belirlendi (sırasıyla 9 gün ve 6 gün, p=0.046). Geçirilmiş serebrovasküler olay öyküsü (OR=1.746, %95 GA=0.692-4.405), primer tıbbi tanı olarak sepsis (OR=59.915; %95 CI=11.880-253.851), pnömoni (OR=6.828; %95 GA=2.081-22.405), elektrolit dengesizliği (OR=23.020; %95 GA=5.296-10.063) ya da yeni serebrovasküler olay (OR=12.166; %95 GA=5.354-27.647) deliryum gelişimi için yatkınlaştırıcı faktörler olarak saptandı.

Sonuç: Deliryum, acil servisten hastaneye yatırılan yaşlı hastalarda hastane içi mortalite artışı ve uzamış hastane kalım süreleri ile ilişkilidir.

Anahtar Sözcükler: Deliryum; Acil Servis; Mortalite; Yaşlı.

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Geliş Tarihi: 27/04/2013
(Received)

Kabul Tarihi: 12/10/2013
(Accepted)

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INTRODUCTION

Delirium is an organic mental disorder characterized by acute onset, an altered level of consciousness, a fluctuating course, and disturbances in orientation, memory, attention, thought and behavior (1-3). The cause of delirium is multifactorial and involves a complex interrelationship between patient vulnerability and precipitating factors (e.g., advanced age, polypharmacy, comorbidity, psychiatric diseases) (2,4,5). Delirium is seen in 7-10% of older Emergency Department (ED) patients, in 11-25% of older hospitalized patients, and in as many as 80% of older patients in the intensive care unit (2,4,6,7). Overlooking delirium in ED patients has been described as a medical error and an issue of quality of care (8). It has been associated with increased morbidity and mortality, prolonged hospital length of stay (LOS), excess annual health care expenditure, and functional and cognitive decline (1,3,4,7,9,10). Unfortunately, delirium is often overlooked in elderly ED and hospitalized patients. The Society for Academic Emergency Medicine Geriatric Task Force has recommended delirium screening in the ED as a key quality indicator for emergency geriatric care (4,11). However, there have been few reports regarding delirium in ED patients and its association with in-hospital mortality and hospital LOS. The goal of our study was to compare in-hospital mortality and in-hospital LOS in elderly ED patients with and without delirium admitted to the hospital. We also aimed to identify the predisposing factors for delirium in those patients.

MATERIALS AND METHOD

This prospective, cross-sectional study was conducted in a tertiary ED of a training and research hospital between January and April of 2012. This ED accepts approximately 200,000 visits per year. The approval of the local ethics committee was obtained for the study.

All patients aged 65 years and older who presented to the ED during the study period were assessed for eligibility. Patients were included in the study if they were admitted to the hospital. Patients were excluded if they refused to consent, were discharged directly from the ED, or were transferred to another institution. Patients with severe mental retardation, Alzheimer's disease or dementia (by their medical history and family interview), baseline communication barriers such as aphasia, deafness, or blindness, and patients who were unable to speak the native language, were comatose, under cardiac arrest, or those who died in the ED were also excluded from the study.
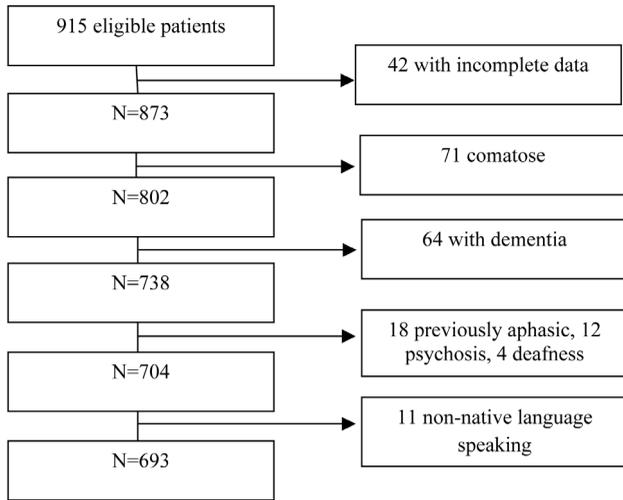
One of the most widely used scales in the diagnosis of delirium is the Confusion Assessment Method (CAM), which was developed for use by non-psychiatrists (2-4,12). The CAM has been validated for use in the ED and is comprised of the nine criteria derived from the Diagnostic and Statistical Manual of Mental Disorders–3rd Edition Revised (DSM III-R) (2,4,7,11). A shortened version of CAM has been used in other studies as a diagnostic algorithm (1,2,3,5,6,8,10) and was used in our study by the emergency physicians because it is easy to use and has excellent interrater reliability (2,4,11-14). The shortened version of CAM consists of four features, which are 1) the acute onset of mental status changes or a fluctuating course, 2) inattention, 3) disorganized thinking, and 4) an altered level of consciousness. If features 1 and 2 are both present and either feature 3 or 4 is present, the patient meets the criteria for delirium. All of the emergency physicians in our department underwent an educational course regarding CAM before the study began. CAM was performed to the patients who meet the inclusion criteria in the emergency department as soon as the admission decision was made.

Demographic data, medical history, in-hospital LOS, in-hospital mortality and the primary medical diagnosis of each patient were recorded. Primary medical diagnosis and clinical outcome of the patients were followed-up from hospital electronic records. The demographic and clinical characteristics of patients with and without delirium were compared.

All statistical analyses were performed with SPSS version 17.0 for Windows (SPSS Inc., IL. USA). Normally distributed variables were expressed as mean and SD, whereas those that were asymmetrically distributed were expressed as median and interquartile range (IQR). To compare proportions and rates, $\chi 2$ tests and a Fisher's exact test were used for categorical variables, an independent sample t-test was used for parametric variables, and a Mann Whitney U test was used for nonparametric variables. Two-tailed p values less than 0.05 were considered to be statistically significant. Independent predictors for delirium were determined with a logistic regression analysis.

RESULTS

A total of 6433 patients aged 65 years and older presented to the ED between January and April 2012. Nine hundred and fifteen were assessed for eligibility and 222 were excluded for variety of reasons (Figure 1). Ultimately, 693 subjects were enrolled in the study.

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              │─────────▶│  42 with incomplete data     │
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│          N=693              │
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Figure 1— Patients meeting inclusion and exclusion criteria.

Three hundred and sixty (51.9%) of the patients were female. The prevalence of delirium was 7.1% (n=49) in admitted geriatric ED patients. The mean age of the study group was 76±7.3 (65-103) years, while the mean ages of patients with and without delirium were 77.8±8 (65-103) years and 75.9±7.2 (65-95) years, respectively There were no significant differences in the characteristics of patients with and without delirium (Table 1).

Patients with and without delirium who had comorbid disorders were 87.8% and 87.9%, respectively (p=0.561). The comorbid disorders of patients with and without delirium are illustrated in Table 2. Delirium was more common in patients who had had a previous cerebrovascular accident (CVA) relative to those who did not have a previous CVA (13.8% vs. 7.1%, respectively, p=0.037).

Patients with and without delirium who were taking 0-3 medications were 72.3% and. 63%, respectively; who were taking 4-7 medications were 23.4% and. 33.8%, respectively; and who were taking 8 or more medications were 4.3% and 3.2%, respectively. There were no significant differences in the number of medications patients with and without delirium were taking.

70.6% of the patients were admitted to a hospital ward and 29.4% of the patients were admitted to the intensive care unit (ICU). Patients with delirium had a higher rate of admission to the ICU than did patients without delirium (44.9% and 28.3%, respectively, p=0.014).

The in-hospital mortality rate was 10.4% (n=72) for our study group. In-hospital mortality was more frequently observed in patients with delirium than in those without delirium (28.6% and 9%, respectively, p<0.001, OR 4.041, 95% CI 2.056-7.945). The median hospital LOS was 9 days (IQR=4-12.5) for patients with delirium and 6 days (IQR=4-11) for patients without delirium (p=0.046).

The primary medical diagnoses of patients with and without delirium are shown in Table 3. Patients with delirium were more likely to have neurologic disorders (CVA), pulmonary disorders [pneumonia, chronic obstructive pulmonary disease (COPD)], infectious disorders (sepsis), and endocrine-metabolic disorders [electrolyte imbalance, diabetes mellitus (DM)] than those without delirium. The most frequent primary diagnoses for patients with delirium were CVA (36.7% of patients with delirium vs. 11.2% of patients without delirium, p<0.001), pneumonia (10.2% of patients with delirium

Table 1— Characteristics of Patients with Delirium Versus Those without Delirium.

Characteristics		Delirium (-) n=644	Delirium (+) n=49	p
Age, yrs.	65-69	148 (23%)	7 (14.3%)	0.439
	70-74	149 (23.1%)	13 (26.5%)	
	75-79	150 (23.3%)	9 (18.4%)	
	80-84	108 (16.8%)	11 (22.4%)	
	≥85	89 (13.8%)	9 (18.4%)	
Sex	Male	315 (49%)	18 (36.7%)	0.100
	Female	329 (51.1%)	31 (63.3%)	
Residence	Family	536 (83.2%)	39 (79.6%)	0.314
	Others*	108 (16.8%)	10 (20.4%)	
Marital status	Currently married	310 (48.1%)	20 (40.1%)	0.201
	Others**	334 (51.9%)	29 (59.2%)	

* Home alone or nursing home. ** Single, divorced or widowed.

Table 2— Comorbid Disorders of Patients with Delirium Versus without Delirium.

Comorbid Disorders	Delirium (-)	Delirium (+)	p
	n %	n %	
CAD	189 (29.3%)	13 (26.5%)	0.671
COPD	110 (17.1%)	8 (16.3%)	0.889
DM	167 (26%)	16 (32.7%)	0.307
HT	383 (59.5%)	28 (57.1%)	0.739
CHF	132 (20.5%)	11 (22.4%)	0.749
RF	60 (9.3%)	4 (8.2%)	0.786
CVA	50 (7.8%)	8 (16.3%)	**0.037**
Parkinson's	4 (0.6%)	-	
Malignancy	63 (9.8%)	3 (6.1%)	0.398
Epilepsy	5 (0.8%)	-	

Abbreviations: CAH: Coronary artery disease; COPD: Chronic obstructive pulmonary disease; DM: Diabetes mellitus; HT: Hypertension; CHF: Congestive heart failure; RF: Renal failure; CVA: Cerebrovascular Accident.

Table 3— Primary Medical Diagnosis of Patients with and without Delirium.

Primary medical diagnosis	Delirium (-)	Delirium (+)	p
	n %	n %	
Cardiovascular Disease (e.g., ACS, CHF)	209 (32.5%)	6 (12.2%)	0.90
Neurologic Disease (e.g., Stroke, epilepsy)	76 (11.8%)	18 (36.7%)	**<0.001**
Pulmonary Disease (e.g., Pneumonia, COPD)	18 (2.8%)	5 (10.2%)	**0.018**
Genitourinary Disease (e.g., RF, UTI)	66 (10.2%)	5 (10.2%)	0.613
Medication toxicity (e.g., digoxin overdose, oral warfarin overdose)	11 (1.7%)	2 (4.1%)	0.233
Trauma/Falls	68 (10.6%)	1 (2%)	0.050
Gastrointestinal Disease (e.g., GIS hemorrhage, pancreatitis, cholangitis)	119 (18.5%)	3 (6.1%)	0.996
Infectious Disease (e.g., sepsis, diabetic foot)	11 (1.7%)	6 (12.2%)	**<0.001**
Oncologic Disease	19 (3%)	1 (2%)	0.580
Endocrine, Nutritional and Metabolic Disease (e.g., DM, electrolyte imbalance)	9 (1.4%)	6 (12.2%)	**<0.001**

Abbreviations: ACS: Acute Coronary Syndrome; CHF: Congestive heart failure; COPD: Chronic obstructive pulmonary disease; RF: Renal failure; UTI: Urinary Tract Infection; GIS: Gastrointestinal System; DM: Diabetes mellitus.

vs. 2.5% of patients without delirium, p<0.001), sepsis (12.2% of patients with delirium vs. 0.5% of patients without delirium, p<0.001) and electrolyte imbalance (8.2% of patients with delirium vs. 0.9% of patients without delirium, p<0.001).

Independent predictors for delirium were previous history of CVA (OR=1.746, 95% CI=0.692-4.405), sepsis (OR=59.915; 95% CI=11.880-253.851), pneumonia (OR=6.828; 95% CI=2.081-22.405), electrolyte imbalance (OR=23.020; 95% CI=5.296-10.063) or current CVA (OR=12.166; 95% CI=5.354-27.647) as the primary medical diagnosis.

DISCUSSION

The aim of this study was to determine in-hospital LOS and in-hospital prognosis in elderly ED patients who were admitted to the hospital with and without delirium. In our study, patients with delirium had a more prolonged in-hospital LOS and had four times greater mortality than the patients without delirium. Delirium is a powerful prognostic marker and has been associated with increased hospital LOS (2,4,15,16). The multicenter study by Inouye et al. with a sample size of 727 reported that the median hospital LOS for patients with delirium was more prolonged and they had dou-

ble the mortality of patients without delirium (15). An ED-based study by Han et al. reported similar results (6). Furthermore, 2 ED-based studies by Han et al. found that 73.1% of patients with delirium were admitted to the hospital, and they were more likely to die at 6 months than those without delirium (37% and 14.3%, respectively) (6,11). Delirium at admission has been reported to be significantly associated with in-hospital mortality, with reported rates ranging from 10-72% (15-18). In our study, we found that the in-hospital mortality rate for older ED patients admitted with delirium was 28.6%.

Despite its association with adverse outcomes, patients are not routinely screened for delirium in the ED. A previous study reported that delirium was overlooked in 75% of elderly ED patients (6). Another study by Han et al. found that hospital staff overlooked delirium in 71.4% of patients with delirium at the time of admission and during hospitalization (8). In addition, Hustey et al. reported that emergency physicians documented only 40% of mental status impairments, and that only 13% of these mental impairments were correctly recognized (10). Due to their frequent occurrence and negative consequences, early recognition of delirium and other mental impairments in the ED may improve patient prognosis.

Our study found a prevalence of delirium in elderly emergency department patients similar to that reported in the literature (1,2,4,6,7,14). However, the actual prevalence may be higher since we only included patients who were admitted to the hospital and we excluded those who are considered at high risk for the development of delirium (e.g. those with dementia, Alzheimer's disease, psychosis, and critically ill patients).

Patients with delirium often have an acute underlying illness. Neurologic (CVA), infectious (sepsis), and metabolic disorders (electrolyte imbalances) are the most common causes of delirium in older ED patients (1,2,4-6,11,14,17,18). Also, existing comorbid diseases increase the risk of delirium. A past medical history of dementia, CVA, or seizure disorder increases the odds of delirium in the ED (19). We found that patients who previously had CVA had a higher rate of delirium than those who did not. In our study, the most frequent primary diagnoses for patients with delirium were CVA, sepsis, electrolyte imbalances, and pneumonia. Although polypharmacy has been reported to be related to the development of delirium (5,20), we found no such association in our study.

Limitations

Several important limitations of this study should be highlighted. First, we excluded patients with dementia, Alzheimer's disease, psychosis, and the critically ill, who are at higher risk for delirium. Second, because of the fluctuating course of delirium, some cases who were initially CAM negative may have become delirious later in the ED or in the hospital. Third, certain groups of patients (i.e. those who died in the ED or were discharged or transferred to another institution) were not assessed. Lastly, this study was performed at a single urban ED.

In conclusion, delirium is associated with increased in-hospital mortality and prolonged hospital LOS in elderly ED patients admitted to the inpatient care. CVA, sepsis, electrolyte imbalances, pneumonia, and previous history of CVA are independent predictors for patients with delirium. Despite its association with adverse outcomes, the ED does not routinely screen for delirium. Earlier detection of delirium in the ED could improve the prognosis.

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